

WHAT IS CLAIMED IS:

1. A method of fabricating a parylene diaphragm acoustic transducer comprising:
depositing backside silicon nitride on a silicon substrate, followed by depositing
layers of first *Al*, insulating parylene and second *Al*;
5 depositing a second thicker parylene layer as a diaphragm;
patterning contact holes to the bottom and top *Al* layers;
releasing the diaphragm by patterning the backside silicon nitride; and
removing portions the silicon substrate by etching to release the diaphragm.
2. A method as claimed in claim 1 including the further step of depositing silicon nitride
10 on a deposition surface of the silicon substrate, and, after removing portions of the silicon
substrate to release the diaphragm, then patterning the silicon nitride top side layer.
3. A method of fabricating a parylene diaphragm acoustic transducer comprising:
depositing silicon nitride on a silicon substrate, followed by depositing a first
conductive layer, an insulating layer, and a second conductive layer;
15 depositing a zinc oxide layer adjacent the insulating layer;
depositing a parylene layer in a form to serve as a diaphragm;
patterning contact holes to the top and bottom conductive layers; and
releasing the diaphragm by removing the underlying silicon substrate.
4. A method as claimed in claim 3 wherein the insulating layer is layer of parylene
20 which is relatively thinner than the diaphragm parylene layer.
5. A method as claimed in claim 4 wherein the zinc oxide ZnO layer is deposited over
the first conductive layer and underneath is deposited after the first conductive layer and
prior to the insulating parylene layer.
6. A method as claimed in claim 5 including the further step of patterning the backside
25 silicon nitride to provide further support for the parylene.

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7. A method as claimed in claim 4 wherein the silicon nitride is patterned to form cantilever type transducer elements supported on a bottom surface of the parylene, and wherein the zinc oxide and electrodes are patterned to only extend along an edge of each of the cantilever style transducers.
- 5 - 8. A method as claimed in claim 7 wherein each of the silicon nitride transducer elements is in a generally trapezoidal shape and arrayed about a center region of the parylene diaphragm layer.
9. A method as claimed in claim 4 wherein the silicon nitride layer underlying the parylene diaphragm layer is patterned to form a single cantilever type transducer including
10 a narrow region of zinc oxide and electrode contacts extending along the side of the transducer supported from the silicon substrate.
10. A method as claimed in claim 9 wherein the cantilever type silicon nitride transducer is generally rectangular in shape.
11. A method as claimed in claim 9 wherein the transducer is a single transducer formed
15 of a layer of silicon nitride in a generally trapezoidal shape with the single zinc oxide layer extending along the edge of the transducer supported directly from the silicon substrate.
12. A parylene diaphragm acoustic transducer comprising a silicon substrate supporting first and second conducting layers, separated by an insulating layer, and having a layer of zinc oxide ZnO in between the first and second conducting layers, and a layer of parylene
20 serving as a diaphragm layer formed over the zinc oxide layer formed at least in part over the zinc oxide layer.
13. A parylene diaphragm transducer wherein the insulating layer between the conducting layers is a thin layer of parylene and the parylene layer serving as a diaphragm is relatively thicker in extent.

14. A parylene diaphragm acoustic transducer including a silicon nitride layer underlying the parylene diaphragm layer in part, the silicon nitride layer defining in cooperation with the zinc oxide layer an acoustic transducer supported from the parylene layer.

5 15. An acoustic transducer as claimed in claim 14 wherein the silicon nitride layer is patterned to form one or more trapezoid shaped cantilever type acoustic transducers underlying the parylene layer and having the zinc oxide layer extending only along an edge of the silicon nitride layer that is directly supported from the underlying silicon substrate.

10 16. A parylene diaphragm acoustic transducer as claimed in claim 14 wherein a center region of the parylene diaphragm layer is occupied by a silicon nitride layer separate from the cantilever type silicon nitride transducer layers, and further having a zinc oxide layer at least partially overlying the silicon nitride layer and separately connected to electrode lines running to separate electrode terminals from the electrode terminals connected to the edged of the cantilever type acoustic transducers.

15 17. A parylene diaphragm acoustic transducer as defined in claim 16 further including a center region of the parylene diaphragm left blank by the cantilever type silicon nitride acoustic transducers, and having thereon a layer of aluminum to emphasize the movement of the parylene diaphragm.

20 18. A parylene diaphragm acoustic transducer as claimed in claim 14 further including a silicon nitride layer underlying the parylene diaphragm and defining a single cantilever type acoustic transducer underlying a portion of the parylene diaphragm layer, and further including the region of zinc oxide extending only along an edge of the cantilever type acoustic transducer supported from the underlying silicon substrate.

19. A parylene diaphragm acoustic transducer as claimed in claim 18 wherein the silicon nitride layer is generally rectangular in shape.

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20. A parylene diaphragm acoustic transducer as claimed in claim 18 wherein the silicon nitride layer is generally trapezoidal in shape.

21. A parylene diaphragm acoustic transducer as claimed in claim 19 wherein the zinc oxide region extends along an edge of the acoustic transducer supported from the silicon substrate, and wherein both the zinc oxide layer and the silicon nitride layer defining the acoustic transducer are periodically interrupted extending therethrough to the parylene diaphragm layer so that the signal energy of the acoustic transducer is focused to an electrode layer connected to the supported edge thereof.